

## Economics 202.04

### Macroeconomic Theory

Spring 2003

Mid-Term Exam, 27 February 2003

Please answer **FIVE QUESTIONS FROM SECTION A and TWO QUESTIONS FROM SECTION B**. SECTION A and B each carry 50% of the marks.

Therefore you should allocate approximately 30 minutes to SECTION A and 30 minutes to SECTION B.

#### SECTION A

**True, False or Uncertain ? Please answer five of the following six questions and provide a brief explanation (e.g., three lines of text plus a small diagram maximum). A correct answer without an explanation will not earn you any marks.**

1. According to the neoclassical theory of distribution, each factor of production is paid its marginal product.
2. In a closed economy with fixed capital and labor and flexible prices (like in Mankiw, Chapter 3), an increase in government spending causes the real interest rate to fall.
3. Inflation makes debtors better off because they end up paying less in real terms on their obligations.
4. In a standard small open economy (perfect capital mobility and perfect substitutability between domestic and foreign bonds, like in Ch.5) an expansionary fiscal policy abroad leads to a fall in domestic investment.
5. An increase in union membership will increase the unemployment rate and reduce wages.
6. An increase of money supply of 5% in the US would lead to a depreciation of the dollar by 5%.

## SECTION B

7. The separation rate  $s$  in an economy is 5 percent and the rate of job finding  $f$  is 7 percent.

- a. Calculate the steady state unemployment rate.
- b. If this economy has 500 workers in the labor force, calculate the unemployment level.
- c. If the separation rate falls to 3 percent, what happens to the steady state unemployment rate and unemployment level?
- d. Assume  $s=3\%$ . If the labor force increases now to 600 workers, what will happen to the steady state rate of unemployment (compared to part c)?

8. Assume an economy has the following production function:

$$Y=F(K,L)=K^{0.5}L^{0.5}$$

- a. State the per-worker production function.
- b. If the savings rate is 0.2 and the depreciation rate is 0.05, calculate the steady-state capital stock per worker, output per worker, and consumption per worker.
- c. Suppose the government increases spending, reducing the country's savings rate to 0.15. Calculate the new steady-state capital stock and output per worker.

9. "According to the Solow growth model, an increase in the saving rate of an economy is always good because it will lead to higher capital and output per worker and higher consumption per worker in steady state". Please comment this sentence as best as you can (use diagrams if you want). [ Hint: think about the golden rule ]

## Economics 202.04 - Macroeconomic Theory

### SKETCH ANSWERS

Spring 2003

Mid-Term Exam, 27 February 2003

Please answer FOUR QUESTIONS FROM SECTION A and TWO QUESTIONS FROM SECTION B. SECTION A and B each carry 50% of the marks.

Therefore you should allocate approximately 30 minutes to SECTION A and 30 minutes to SECTION B.

#### SECTION A

**True, False or Uncertain? Please answer any four of the following six questions and provide a brief explanation (e.g., three lines of text plus a small diagram maximum). A correct answer without an explanation will not earn you any marks.**

1. According to the neoclassical theory of distribution, each factor of production is paid its marginal product.

TRUE. SIMPLY  $Y = MPK * K + MPL * L$ . UNDER CONSTANT RETURNS TO SCALE, THE SUM OF FACTOR PAYMENTS ALSO EXHAUSTS TOTAL PRODUCT, AND ECONOMIC PROFIT IS ZERO.

2. In a closed economy with fixed capital and labor and flexible prices (like in Chapter 3), an increase in government spending causes the real interest rates to fall.

FALSE. THE INCREASE IN G WILL REDUCE NATIONAL SAVING BY THE SAME AMOUNT (SEE FIGURE 3-8 IN MANKIW) AND WILL LEAD TO AN INCREASE IN THE REAL INTEREST RATE.

3. Inflation makes debtors better off because they end up paying less in real terms on their obligations.

TRUE ONLY IF INFLATION IS UNANTICIPATED (AND DEBT CONTRACTS ARE WRITTEN IN NOMINAL TERMS). WHEN INFLATION IS ANTICIPATED, ONE WOULD EXPECT THAT THE NOMINAL INTEREST RATES TAKES EXPECTED INFLATION INTO ACCOUNT. (SEE PAGES 98-99 IN MANKIW).

4. In a standard small open economy (perfect capital mobility and perfect substitutability between domestic and foreign bonds, like in Ch.5) an expansionary fiscal policy abroad will lead to a fall in domestic investment.

TRUE (SEE FIGURE 5.4 IN MANKIW). AN EXPANSIONARY FISCAL POLICY ABROAD RISES THE WORLD INTEREST RATE. UNDER PERFECT CAPITAL MOBILITY, THE DOMESTIC INTEREST RATE RISES BY THE SAME AMOUNT, AND INVESTMENT FALLS.

5. An increase in union membership will increase the unemployment rate and reduce wages.

FALSE. Increased union membership will increase wages through collective bargaining. The higher wages will lead to more unemployment as firms decrease their labor demand and longer waiting times for jobs.

6. An increase of money supply of 5% in the US would lead to a depreciation of the dollar by 5%.

TRUE. An increase in money supply will lead to increase in prices by 5%. According the PPP, the nominal exchange rate must depreciate by 5% to keep the real exchange rate constant.

## SECTION B

7. The separation rate  $s$  in an economy is 5 percent and the rate of job finding  $f$  is 7 percent.

e. Calculate the steady state unemployment rate.

The steady state unemployment rate is the point at which the number of people finding jobs equals the number of people leaving jobs:  $fU=sE$ . We can substitute for employed workers using  $E=L-U$ . Solving for  $U/L$ :  $U/L = s/(f+s)=(0.05)/(0.07+0.05) *100= 41.7\%$ .

f. If this economy has 500 workers in the labor force, calculate the unemployment level.

Since the labor force has 500 workers, the unemployment level =  $0.417*500 = 208$  unemployed.

g. If the separation rate falls to 3 percent, what happens to the steady state unemployment rate and unemployment level?

If the separation rate falls to 3 percent, the unemployment rate will now be  $U/L = 0.03/(0.07+0.03)*100= 30\%$ . Then unemployment level is 150 ( $0.3*500$ ) unemployed

h. Assume  $s=3\%$ . If the labor force increases now to 600 workers, what will happen to the steady state rate of unemployment (compared to part c)?

The steady state unemployment rate remains unchanged at 30% ( $u=s/(s+f)$  regardless of  $L$ ).

8. Assume an economy has the following production function:  
 $Y=F(K,L)=K^{0.5}L^{0.5}$

a. State the per-worker production function.

$$y = k^{0.5}$$

b. If the savings rate is 0.2 and the depreciation rate is 0.05, calculate the steady-state capital stock per worker, output per worker, and consumption per worker.

$$0.2 * k^{0.5} = 0.05 * k; k = 4^2 = 16;$$

c. Suppose the government increases spending, reducing the country's savings rate to 0.15. Calculate the new steady-state capital stock and output per worker.

$$y = k^{0.5} = 4; c = y - i = 4 - dk = 4 - 0.05 \cdot 16 = 3.2$$

$$0.15 \cdot k^{0.5} = 0.05 \cdot k; k = 9; y = k^{0.5} = 3$$

9. "According to the Solow growth model, an increase in the saving rate of an economy is always good because it will lead to higher capital and output per worker and higher consumption per worker in steady state". Please comment this sentence as best as you can (use diagrams if you want). [ Hint: think about the golden rule ]

An increase in the savings rate leads to more capital and output. Whether such an increase also leads to more consumption depends on whether the initial saving rate is above the golden rule saving rate. When the initial saving rate is too low (capital is below golden rule), an increase in the saving rate will also lead to higher consumption per worker in steady state.